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Reconstructing the history of landslides in northern Japan through dendrogeomorphology

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Dendrogeomorphology serves as a method to determine the timing of historical landslide events. This approach entails scrutinizing the spatial and temporal aspects of landslide occurrences by investigating their impact on tree growth by analyzing variations in tree-ring width, recovery timeline of injured tree stem, as well as the age of tree invasion and establishment in areas affected by landsliding. The method's advantage lies in its capacity to yield a large number of samples where trees are growing. This study encompasses research conducted in both the Sansukezawa landslide in Aomori Prefecture and the Kamitokitozawa landslide in Akita Prefecture, Japan. The examination includes an analysis of the reactions of a combined total of 187 tilted deciduous broadleaved trees and coniferous trees aged between 10^0 and 10^2 years in response to landslide events. The findings, revealed by variations in tree-ring width, suggested multiple landslide occurrences at the Sansukezawa landslide between 1901 and 2000. The magnitude of these events varied, encompassing localized activities such as the enlargement of landslide scarps to more extensive landslide movements. In the Kamitokitozawa landslide area, the development of impending landslide events, inferred from the recovery timeline of injured tree stems, included scarp expansion. There were five instances of landslide activities recorded during the period from 1999 to 2019.